International Technology and Innovation Conference 2009

(ITIC 2009)

IET Conference Publications 556

Xi’an, China
12-14 October 2009

ISBN: 978-1-61738-297-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2009) by the Institution of Engineering and Technology
All rights reserved.

Printed by Curran Associates, Inc. (2010)

For permission requests, please contact the Institution of Engineering and Technology
at the address below.

Institution of Engineering and Technology
P. O. Box 96
Stevenage, Hertfordshire
U.K. SG1 2SD

Phone: 01-441-438-767-328-328
Fax: 01-441-438-767-328-375

www.theiet.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

The Application of Multidisciplinary Design Optimization in IC Engine's Energy Saving 1
Zhao Lifeng, Li Yunqing, Meng Yunxia

Study on Exhaust System Parameters for Fuel Economy Improvement of Small Gasoline Engine 5
Peng He, Yunqing Li, Lifeng Zhao

A Repetitive Control Strategy of AC Electronic Load with Energy Recycling 10
Wang Shaokun, Hou Zhenyi, Peng Chuanbiao

Convective Heat Transfer and Flow Resistance Characteristics in Sinusoidal Corrugated Tube 14
Hu Yonghai, Tong Zhengming

The Study of the Impact of Technology Advance on China's Energy Consumption Per Unit GDP 19
Shang Jie, Li Ningning

Research on Chinese Household Practical Energy Technologies 23
Zhang Bo, Chen Hongbo

Spray Characterization of a Swirl-type Injector for Gasoline Direct Injection Engines 28
Li Yunqing, Li Bo, Wang Defu

Spray Impingement Characterization of a Swirl Type Injector for Gasoline Direct Injection Engines 33
Li Bo, Li Yunqing, Wang Defu

Research on Chinese Renewable Energy's Chain Development Strategy Based on Vis Analysis 39
Li Xiaoyu, Zhang Mingyu, Zhang Kai

Study on New Energy and Renewable Energy Industry Development Strategy and Deployment of Beijing Based on SWOT Analysis 43
Li Xiaoyu, Zhang Mingyu, Wu Wenbing

Characteristics of Heat Transfer for AI_2O_3-water Two-phase Fluids 47
Yanbing Zong, Daqiang Cang, Yi Jin, Rongjun Wang

Development and Application of Novel Energy-savings Material in Steel Industry 52
Cang Daqiang, Zong Yanbing, Bai Hao, Zhou Huiming

Automatic Meter Reading System Based on Power Line Communication of LonWorks 57
Lin Weijie, Wu Qiuxuan, Huang Yuewen

A New Type of VAWT and Blade Optimization 62
Hu Yonghai, Tong Zhengmin, Wang Shanshan

Improving the Efficiency of Solar Photovoltaic Power Generation in Several Important Ways 67
Dai Qinghui, Chen Jun

An Instantaneous Model and Its Implementation in Speed Regulator for HEV Engine 70
Zhang Yunxia, Feng Qishan

Mode Analysis on MW Grade Wind Turbine 75
Miao Lei, Shan Guangkun, Yao Xingjia

Research on Performance of Aerostatic Journal Bearing with Variable-section Pressure Equalizing Groove of Elastic Membrane 79
Zhang Jun-An, Liao Bo, Dong Hao, Liu Bo

Study of Fender NC Incremental Sheet Metal Forming 85
Zhou Liuru

Study on the Preparation Technology and Fretting Damage Resistance Property of Coatings on Titanium Alloy 88
Yang Lingling, Song Danlu, Shi Xiao

Experimental Study on the Effects of Oil / Water Emulsion on Machining Stainless Steel 92
Liu Yongjiang, Wang Ailing, Wang Biao, Liu Zhaohua

Research on the Motion Control System of Multilayer Cloth-cutting Machine 96
Shi Weimin, Wang Songjie, Gu Yeqin, Pan Yunlei

Reinforcement Study on Photosensitive Resins Toughness with SiC Whiskers 101
Liu Yongjiang, Wang Ailing, Zhu Limei, Wang Biao

Study on CNC/CAD/CAPP/CAM Integration a System Modeling for Rotational Parts 105
Hu Deji, Cao Wenjie, Liu Yanling

Research on the Numerical Fitting Method of the Spiral Surface Cross-section 109
Zhao Wei, Tang Shijun, Hu Deji, Ma Suchang, Yan Liwen

Study on Reconfiguration Cost Modelling of Reconfigurable Manufacturing System 113
Chen Jie, Zhang Liang-Wei, Luo Jian-Qiang

Experimental Investigation on Electrochemical Micromachining 119
Deng Yu, Guo Zhongning, Mo Binghua

Spherical Harmonic Analysis Based on Projection Rays for 3D Model Retrieval 124
Lin Lin, Ding Gang, Chen Fangyu
A Research on the Automatic Generation of the Network Diagram 129
Lin Lin, Ding Gang, Xu Lianfang
Experiments Study of Ultrasonical Combined Electrical Micromachining Micro-structures on Working Surface of Friction Units 134
Wang Zhanhe, Zhu Yongwei, Fan Zhongjun, Yun Naizhang
Experimental Study on Numerical Control Electrochemical Machining of Rotary Parts 139
Kang Min, Fu Xiuqing, Ji Haibing
Information Extraction System Model Based on STEP-NC Program 144
Luo Yongsheng, Jiang Tingbiao
A Solution for Ethernet-based Real-time Communication Network of Distributed Numerical Control System 149
Tao Lin, Jiang Tingbiao, Zhang Xiangli
Deformation Mechanism Analysis on Laser Brazing CBN Gear-honing-tool 155
Liang Guoxing, Lv Ming, Ma Lin, Song Yonggang
Effect of Part-cutter Deflection on Flexible Milling Force in High Speed Peripheral Milling Process 161
Qi Houjun, Zhang Dawei, Yan Bing, Cai Yujun
A Novel Method for Fabrication of Meso-scale Cutting Tool 166
Jiang Fang, Wang Xibin, Meng Aiping
Finite Element Analysis of Steel Cord Conveyor Belt Splice 170
Song Weigang, Shang Wenjie, Li Xiaosen
Study on the Acoustic System of the Ultrasonic Micro Milling Machine 176
Zhang Yundian, Lan Hongyu
Study on Reverse Copying Precision of Micro Electrode Array Fabricated by Micro-EDM 182
Zeng Weiliang, Liu Ying, Wang Zhenlong
Design and Development of Megasonic System and Its Application to PZT Nano Powder Dispersion 186
Peng Yun, Wang Wei
Structural Design and Experimental Study of a Precision Positioning Table 192
Wu Yimin, Yan Shijing, Zhou Zhige, Wang Haixia
Kinematics Analysis and Experimental Study on Ultrasonic Vibration Honing 197
Wang Jianqing, Shao Yanjun, Zhu Xijin
Research on the Modify of Mechanism of Fluid Magnetic Abrasivetool 201
Li Weidong, Zhang Hong
Research on Straightness Error Evaluation of Shaft Parts Based on Genetic Algorithms with Transfer-operator 204
Yan Liwen, Yan Bing, Cai Lanrong, Qi Houjun, Zhao Wei
Cutting Performance and Failure Characteristic of New Cutting Tool in Dry Milling of High-strength Steel 209
Liu Zhibing, Wang Xibin
Characteristic of Surface Profile and Roughness in Micro Turn-milling of Aluminum Alloy 2A12 213
Liu Zhibing, Wang Xibin
Theoretical Analysis and Numerical Simulation of External Spline Cold Rolling 217
Zhang Dawei, Li Yongtang, Fu Jianhua, Zheng Quangang
Pipe Routing Design and Assembly Planning Technology in Virtual Environment 224
Jianhua Liu, Ruxin Ning, Qidong Hu
Dynamics Analysis of Cutting Mechanism of Underwater Guillotine Pipe Saw 231
Gong Haixia, Wang Ying, Han Jiakui, Jia Peng
Research on the Simulation System of NC Milling 236
Hu Yanjuan, Wang Yiqiang, Guang Xuesong, Wang Yao, Yuan Xiuhua
Assembly Simulation Research for Hydraulic Transformer with Virtual Manufacturing Technology 240
Zang Faye
Formability Analysis and Optimization of the Braking Cylinder Block for One Drawing Step 246
Wu Chengge, Fang Qianghan, Zhao Kangpei, Li Sixiang, Zhang Zunguo, Dou Yingcheng
Applications of CFD in Design of Oil-mist Cooling and Separation 251
Chen Shenrong, Xu Gaochun, Zhu Hongping, Ruan Hegen, Li Limin
Hierarchical Modeling and Simulation of Dynamic Production Logistic System 256
Chen Huawei, Wang Aimin, Ning Ruxin
Physically Based Collision Response in Virtual Assembly 261
Hou Weiwei, Liu Jianhua, Ning Ruxin
Study of Assembly Line Dynamic Balancing Based on Simulation 265
Wang Hongjun, Wang Hongfeng, Zhang Huaicun

Layout Research of Campus Traffic System Based on System Simulation 269
Jiang Lian-Fu, Sun Gai-Tao, Zhang Na
Material Logistic Process Control in Hierarchical Workshop Model 274
Chen Huawei, Wang Aimin, Ning Ruxin
Study on the Mechanisms and Simulation of the Tool Wear Process in Machining of Stainless Steels with Carbide Tools 280
Xie Lijing, Li Lin, Ding Yue, Wang Xibin
Simulation of Heat Transfer Performance for Integral Steel Fin-tube Through ANASYS 285
Zong Yanbing, Cang Daqiang, Bai Hao, Wang Haofei, Gao Yufeng
Vibration and Noise Measurement Synchronous and Analysis on Paper Transmitting System for Sheet-fed Offset Press 290
Wang Yiming, Wu Shuqin, Peng Ming, Bai Jianjun
Development of a Novel Three-axis Force Sensor 295
Zhang Xin
Real-time Measurement Method for Object Space 6-D Information 299
Tian Yingzhong, Gao Yu, Zhang Zhenyou, Li Ming
Automatic Pairing Measurement of Servo Valve Nozzles and Experimental Research 303
Pan Xudong, Wang Guanglin, Hu Yang, Shao Dongxiang
A Study on the Properties of Rapidly Prototyped Wood-plastic Composites Based on Selective Laser Sintering 307
Xin Zongsheng, Guo Yanling, Yu Ping, Zeng Weiliang
Reverse Engineering System Based on Cross-sectional Image Measuring System 312
Zhao Liqin, Wang Biao
Research on the Initial Design Feature for CAD Modeling 317
He Chaoming, Liu Guangshuai, Xiong Ying, Lei Huatang
Cracking Behavior of Laser Cladding Forming Nickel Based Alloys 322
Song Jianli, Li Yongtang, Fu Jianhua, Deng Qilin, Hu Dejin
Numerical Simulation of the Three-dimensional Temperature Field in Laser Cladding Forming Process 327
Song Jianli, Liu Zhiqi, Qi Huiping, Du Shiwen, Li Yongtang, Deng Qilin
Research and Application of Parametric Design for Overhead Traveling Crane Based on the Holographic Model 333
Wu Shufang, Wang Zongyan, Wang Yi, Wang Xingwen
Rapid Variant Design Method of Crane Based on Parameterized Templates 338
Lu Chunyue, Wang Zongyan, Zhang Weiqiang
Coaxial Powder Delivery System for Laser Metal Deposition Shaping 344
Zhang Kai, Liu Weijun, Shang Xiaofeng
Research on Data Processing Technology of Rapid Prototyping Based on Laser-induced Chemical Liquid Deposition 349
Song Danlu, Yang Lingling, Chen Weichuang, Shi Xiao
Parameter Identifications of the Hydraulic Mount 354
Zhang Yunxia, Shangguan Wen-Bin, Fang Zuhua
Circular-economy-oriented EPR: the Status Quo & Countermeasures in China 359
Ma Xiangyang, J. Duval, Cao Rui
New Developments of CRM in Theory: The Integration Between CRM and Other Business and Technology Orientations 364
Ma Xiangyang, J. Duval, Cao Rui
Multi-constrained Module Partition for DFMC 369
J. Chen, Y. W. Zhao, F. Y. Li, J. F. Li
Research of Product Requirement Design for the Concurrent Design 376
Liu Junying, Li Suling
The Research and Implementation of Knowledge Management Technology in the Ship Collaborative Design 380
Xu Zhaohui, Hu Xiaoping, Yu Baohua, Ye Hongxian
Study on the Modern Generalized Optimization Design Based on Collaborative Virtual Prototype Technology 385
Wang Xuewen, Duan Lei, Xiang Hu, Li Kunpeng, Yang Zhaojian, Shu Xuefeng
An Algorithm of Robust Design: Orthogonal Optimum Design and Variance Ratio Analysis 390
Li Yongxian, Sun Mingli
The Innovative Design on the Scheme of the Vertical Turn Stereo Garage Based on TRIZ and AD 395
Zhang Ruijun, Zhang Mingqin, Wang Xiaowei, Han Lifang, Li Min

A Study of Critical Path Algorithm Based on Transforming Complex Relations Into Dummy Tasks 401
Liu Gang, Gao Qi, Jiao Wenxue, Zhang Shanhui, Wang Peigang
Finite Element Analysis on the Rolling-mill Housing of the Dry-powder-embedded Zinc-air Battery Plate Forming Equipment 406
Guan Yuming, Wang Pengfei, Xiao Yanchun, Xu Bo
The Conditions of Inventory Cost for the Supplier Adopting VMI Strategy 411
Xu Zhangyi, Huang Jieting, Li Menglan
FEM Analysis and Optimization for the Welded Metal Belows Mechanical Seal 414
M. Ahmat, H. Isimayi, R. Nuer, M. Geni
Cutting Parameter Optimization for Large Diameter Hydraulic Cylinder of 7A04 Aluminum Alloy 417
Zeng Zhiqiang, Yang Fuhe, Du Wenhua
Optimal Tolerance Design for Green Manufacturing 422
Liu Shaogang, Wang Ping, Jin Qiu
A Hybrid Algorithm for Surplus Material Utilization Based on Integrated Evaluation and Matching Rules 425
Lu Yuan, Hu Ying, Tu Haining
Optimization Design of Metallic Seal Pair Structure for Triple Offset Butterfly Valve 430
Ding Qingxin, Sun Guangbin, Zhao Honglin, Zhang Shimin
Simultaneous Topology and Sizing Optimization of Trusses by an Improved Genetic Algorithm 435
Guo Lihua, Tang Wencheng, Yuan Man
Group FEM Model and Application for Tube Shape Prediction in Stretch Reducing Process 440
Yu Hui, Du Fengshan
The Reverse Design Method for Cam Contours and Motion Specification 444
Ge Zhenghao, Su Penggang, Yang Fulian, Jiang Meng
Model Repair in Polygonal Meshes Using a Surface Oriented Algorithm 448
Liu Guangshuai, Li Bailin, He Chaoming, Tian Yaling
Research of Critical Techniques Based on CAD/CAM Software 453
Sun Shufeng
A Genetic Algorithm for the Rectangular Packing Problem of Placement Function 458
Wang Jinmin, Zhu Yanhua, Wang Baochun
An Optimal Parameterization Algorithm for Discrete Surface 463
Liu Guangshuai, Li Bailin, He Chaoming, Tian Yaling
A Study of Spur Gear Torsional Mesh Stiffness 469
Wu Zhifei, Wang Tie, Zhang Ruiliang
Integration Model of Cooperation E-commerce Based on Web Services 473
Li Gang, Qian Xingsan, Ye Chunming
Research on Mapping Between Product Function Model and Assembly 477
Tian Jianping, Zhang Xu
Design of Database System for High Speed Machining Based on Web 482
Liu Lijuan, Yan Xuhui, Wu Wenge
Arithmetic Research About Boolean Operation of Surfel Model Based on Hierarchical Bounding Volumes 487
He Chaoming, Liu Guangshuai, Xiong Ying, Lei Huatang
Research on a Weighting Alignment Method for Investment Casting Turbine Blade Shape Inspection 492
Cheng Yunyong, Zhang Dinghua, Huang Shengli, Bu Kun
Characteristic Parameters of Machine Joints and the Technology for Applying Them in Overall Modeling 496
Zhao Honglin, Wu Zhiheng, Zhang Guangpeng, Ding Qingxin
Machining Feature Recognition for DFM Evaluation 501
Zhang Xu, Qi Guangming, Zhang Jun
An Optimized Isoscallop Height Cutting Paths Planning Method Based on Cross-entropy Optimization Algorithm 506
Pan Xin, Cai Yujun, Li Zhen, Sun Lijie
Welding Multi-robot Task Allocation for BIW Based on Hill Climbing Genetic Algorithm 511
Li Yanping, Liu Haijiang
Study on Visualized Conversion Technology of Distributed Agent-based CAD Model 519
Tang Dingyong, Sun Linfu, Tao Yizhen, Cheng Zheng
Research on Dynamic Characteristics of Printing Press' Paper Transferring System Based on Experimental Modal Analysis 523
Wang Yiming, Peng Ming, Wang Xinzhu, Cai Jifei
The Optimization of Shifting Coefficient in Internal Parallel Move Gears Transmission 529
Han Gang, Zhang Chunlin, Zhi Huiqing, Wang Songlei

Study on the Variables in Designing the Internal Parallel Move Gears Transmission 532
Tian Xiaoming, Han Gang, Zhang Chunlin, Wang Songlei
Application Study of Water Kettle Handle Injection Molding 535
Kuang Weihua, Cui Jianqiang
Case Study for Integrating the Line Balancing and the Shop Layout Based on AutoCAD 539
Pei Ling, Li Feng, Lin Fuquan, Wang Wei
Reliability and Maintainability Optimization of Mechanical System Based on the Life Cycle Cost 544
Wang Yuling, Li Fangyi, Yang Yong, Dong Zhengwen
A Characterization Model and a Normalization System of the LCIA for Chinese Electromechanical Products 548
Wang Xiaowei, Li Jianfeng, Li Fangyi, Zhang Ruijun, Wang Liming, Guo Anfu
Assessment on Green Degree of Biodegradable Packaging Material Based on LCA and FAHP Methodology 553
Guo Anfu, Li Jianfeng, Li Fangyi, Wei Baokun, Wang Xiaowei, Liu Gang
Study of Residual Life Prediction and Maintenance Decision-making of Portal Crane 558
Chen Yan, Sun Yuantao
Research on Theory of Reconfigurable for NC Machine Tool 562
Wang Youjun, Zhang Dinghua, Yao Kai, Hou Zhongming, Wu Fujia
Heater Operation Optimization in Tin Bath 567
Zhang Qin, Chen Zejing, Li Zhixin
The Effect of Annealing Process on the Microstructure of Fe-0.3%SI Electrical Steel 573
Yang Hui, Wang Jingling, Xu Chaohui, Jin Zilii, Wang Haiyan
Distribution Characteristics of Point Discharge Effect in the Process of Electroplating CBN Gear-honing-tool 576
Li Wenbin, Liang Guoxing, Ya Gang, Lv Ming
Kinematic and Finite Element Analysis of Upsetting Process by Slider-crank Mechanism 581
Kuang Weihua
Estimation of Uncertainty in Form Error CMM Measurement According to New GPS Standard System 585
Sun Yingda, Xu Wenqin, Zhu Liangrong, Du Haiqing, Zhang Ya
Tooth Flank Feature Analysis and Study on Grinding Method of Full Edge Gear Honer 589
Zhang Xiuqing, Lv Ming, Yan Hongyuan, Ma Lin
Localization Variation Stream Propagation Modeling of Multi-operation Machining in IL&SM Fixturing 593
Wang Qingxia, Li Beizhi, Mao Qibin
A Systematic Innovation Design Method Based on Patent 598
Zhang Lujun
An Economic Analysis on Marketing Channel Conflict 601
Zhao Longwen, Long Yan
Product Innovative Design Based on AHP/QFD/TRIZ 606
Zhang Fuying, Zhang Qinging, Wang Ping, Liu Hui
Study of Priority Assessment of Multiple Mechanical Product Projects Based on AHP and GRA 611
Chen Yan, Chen Hongming
Dynamics Characteristic Study of the Visco-elastic Suspension System of Construction Vehicles 616
Zhang Xin, Sun Dagang, Song Yong, Yan Bijuan
The Method of Making Production Plan in Mass Customization 620
Ma Yu Fang, Wang Fu Dong, Zeng Yue Ming
Modelling and Analysis of Value Chain of Scientific and Technological Innovation 625
Song Hua, Yun Jun
Active Push Technology for Multidisciplinary Auxiliary Knowledge in Product Design 630
Wang Shuang, Yin Guofu, He Zhongxiu
The Study of a Self-adaptive Evolutionary Programming and Using in Engine CBR Design System 635
Yan Wei, Gao Qi, Liu Zhenggang, Zhang Shanhui, Liu Hui, Hu Yuping
Research on Level-2-computer Control System for Heat-furnace in Plate Heat Treatment Line 641
Li Hongjie, Gong Xiulian, Wang Jianmei, Huang Qingxue
Fuzzy Control of the Ram Velocity in Energy-saving Servo Injection Molding Machines 645
Wang Shuo, Ying Ji, Zhou Weian, Ke Min
Research on Reliability Modeling of Complex System Based on Dynamic Fault Tree 650
Yuan Jing, Long Yong, Li Yanling, Xu Rui
Simulation Research of the Electro-hydraulic Control System of CVT Metal V-belt's Axial-misalignment 655
Zang Faye

Study on Monitor System of Heating Ventilation Air Conditioning Based on LonWorks Technology 660
Lin Weijie, Huang Yuewen, Wu Qiuxuan
A Pulverized Coal Concentration Measurement System Based on Capacitance Sensor 665
Chen Xia, Hu Hongli, Liu Zhihong
A Study of ECT Image Reconstruction Algorithm in Two-phase Flow Measurement 669
Zhang Juan, Hu Hongli, Wang Congcong, Chen Xia
Local Image Contrast Enhancement Under Nonuniform Illumination 674
Jiao Linan, Sun Zhaoyun, Sha Aimin
A Computer Vision Approach for Fabric Defects Inspection 679
Liu Shu-Guang, Qu Ping-Ge
Parallel Mechanism Character Arrays of Topology Graphs Isomorphism Identification and Creation Automatically 683
Ding Ling, Lu Yi, Wen Jia
Research on Trajectory Tracking Control of Nonholonomic Wheeled Mobile Service Robots 688
Chang Jiang, Meng Qingxin
Multidisciplinary Collaborative Optimization Design of Robots 693
Zhang Jing, Li Bailin, Liu Yongjun
Modified Particle Filter Algorithm for Mobile Robot Simultaneous Localization and Mapping 698
Wang Zhongmin, Miao Dehua, Du Zhijiang
Constraint Forces Applied on Limbs of 3-RPS Parallel Manipulator in Static Equilibrium 703
Cui Qunfeng, Zheng Xiangzhou
Inverse Kinematics Computation in Robotics Using Conformal Geometric Algebra 708
Wang Chaoqun, Wu Hongtao, Miao Qunhua
The Improved Potential Grid Method in Robot Path Planning 713
Li Chunshu, Lu Haifeng, Cui Genqun
Research on Detection System for Coal Mine Detection Robot Based on the Technology of Information Fusion 718
Niu Zhigang, Fu Zhichao
Research on Path Planning for Coal Mine Detection Robot 723
Niu Zhigang, Liu Xiaoheng
The Magnetic Field Analysis and Optimization of Permanent-magnetic Adhesion Device for a Novel Wall-climbing Robot 728
Yao Pingxi, Li Dewei
Author Index